

## **Issue & Proposal**

#### Coasts and estuaries: areas with both economic and ecological issues

- Urbanization, harbour, industrial and tourism activities
- Wetlands, corridor for migratory fish, rest area for migratory waterbirds

#### Areas affected by strong variations of water level

For example in Seine: max tidal range = 8m and twice every day

→ in connection with many forcings: tide, wave, storm surge, streamflow & groundwater



#### Issue

To understand the interactions between different water bodies (river, groundwater, sea) and their impact on the spatio-temporal variability of water levels

#### **Proposal in TOSCA program**

Characterisation and modeling of the hydrological variability in the coastal zones in the framework of the SWOT mission

Application to the Seine and Gironde estuaries & coastline of the Up. Normandy

6 teams: M2C Rouen-Caen, LETG Caen, LDO Brest, EPOC Bordeaux, LEGOS Toulouse, SISYPHE Paris 6 et Mines ParisTech

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### **c**nes

## **Objectives of the proposal**

#### **Main Objective:**

To understand and model the interactions between the different hydro-meteofactors and different water bodies and their impact on water levels in coastal areas

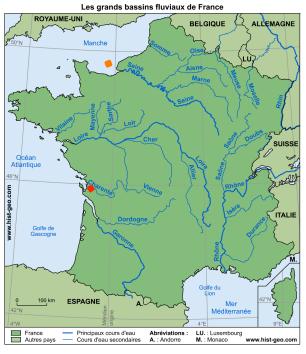
## Comparative study of the hydrological variability of 3 coastal systems

- Seine estuary Length 160 km, width 150m to 8 km (at the mouth) max tidal range 8m (at the mouth)
- Gironde estuary the largest estuary in Europe (635 km²) length 75 km, width up to 12 km at the mouth
- Upper Normandy coast : Coastal line 120 km, max tidal range 10m



#### 3 axes (= 3 objectives)

- Study the contribution of different factors in the variability of water level using the signal analysis & processing methods applied to the in-situ measurements
- Modeling the spatio-temporal variability of water levels and factors and SWOT calibration/validation (Comparison models & simulated SWOT data)
- Preparation and calibration of AirSWOT airborne campaign using the analysis of in-situ data and modeling





# SWOT interest and conditions for measurements



#### Interest for SWOT to work on the Seine & Gironde estuaries

Numerous studies & important data base: many gauging stations on the river & tributaries, bathymetric surveys, piezometric data, 10 tide-gauges on the Gironde & 17 tide-gauges & LIDAR survey on the Seine

#### **SWOT** interest for the partners working on the Seine and Gironde estuaries

To have spatial information in 2D on the water levels in key sectors (mouth & island areas) and not just at 1 point with 1 tide-gauge

#### Conditions for carrying out the SWOT measurements

- Ideal: to have measures in all hydrological conditions = 12 cases throughout the year, crossing flow variations of the Seine and tide
- → Needs: High resolution & Vector data & Simulated daily SWOT data spatial resolution depends on the location and width: 150m to 10km
- Preferred measurement period: throughout the year & for AirSWOT in Winter during the highest flows (and floods) and crossing with highest tidal range
- Preferred study areas: all estuaries and coastal zone or key sectors: mouth or island areas

SWOT, First Science Definition Team meeting, Pasadena, January 28-30, 2013